The American Journal on Addictions, 16:352–356, 2007
Copyright © American Academy of Addiction Psychiatry
ISSN: 1055-0496 print / 1521-0391 online
DOI: 10.1080/10550490701525368

Self-Treatment of Opioid Withdrawal with a Dietary Supplement, Kratom

Edward W. Boyer, MD, PhD,[1] Kavita M. Babu, MD,[1] Grace E. Macalino, PhD,[2] Wilson Compton, MD, MPH[3]

[1]Division of Medical Toxicology, Department of Emergency Medicine, University of Massachusetts Medical School, Worcester, Massachusetts
[2]Tufts-New England Medical Center, Boston, Massachusetts
[3]National Institute on Drug Abuse, Rockville, Maryland

We examined the use of Kratom (Mitragyna sp.*), a dietary supplement with mu-opioid agonist activity, by members of a cybercommunity who self-treat chronic pain with opioid analgesics from Internet pharmacies. Within one year, an increase in the number of mentions on Drugbuyers.com, a Web site that facilitates the online purchase of opioid analgesics, suggested that members began managing opioid withdrawal with Kratom. This study demonstrates the rapidity with which information on psychoactive substances disseminates through online communities and suggests that online surveillance may be important to the generation of effective opioid analgesic abuse prevention strategies.* (Am J Addict 2007;16:352–356)

Recent increases in the use of opioid analgesics (e.g., hydrocodone and oxycodone, among others) may represent an expanded pathway to opioid addiction that is driven, in part, by new sources of access to these drugs.[1,2] Internet pharmacies, which sell drugs to anyone who can afford to pay, are theorized to increase the availability of opioid analgesic agents as well as the risk of opioid abuse and addiction.[1,3] As part of ongoing research examining the relationship between Internet pharmacies and substance abuse, we have identified several ''pharmacy watch'' Web sites.[3,4] One, www.drugbuyers.com, not only facilitates the purchase of pharmaceuticals from Internet pharmacies, but also serves as a resource through which information on the self-treatment of chronic pain is disseminated among members. Much of information exchanged on Drugbuyers relates to sources of opioid analgesics, tolerance to opioids, and management of withdrawal using opioid replacement therapy or herbal products.

One such herbal product is Kratom (*Mitragyna speciosa Korth*), a tree native to southeast Asia and Africa.[5] Mitragynine, the most prevalent alkaloid isolated from Kratom, and its congeners possess agonist activity at mu- and delta-opioid receptors and are responsible for the drug's opioid-like effects.[6–8] Additional animal studies suggest that mitragynine, a non-opioid indole alkaloid, may also stimulate post-synaptic alpha-2 adrenergic receptors and/or antagonize stimulation of 5-HT_{2A} receptors.[9] Kratom was traditionally used in Thailand and Malaysia by manual laborers to enhance productivity and for its euphoric effects; its indication for treatment of pain and opium withdrawal was described as early as 1897.[5,10] Kratom is sold by many Internet vendors, suggesting extensive demand for this product.[11] After identifying the use of Kratom by Drugbuyer's members, we investigated the ways in which Drugbuyer's members incorporated this herb into existing patterns of opioid analgesic use.

Received September 27, 2006; revised November 15, 2006; accepted November 30, 2006.

Address correspondence to Dr. Boyer, Division of Medical Toxicology, University of Massachusetts Medical School, 55 Lake Avenue North, Worcester, MA 01655. E-mail: edward.boyer@childrens.harvard.edu.

METHODS

We constructed a dataset of Kratom mentions from postings generated by the 113,000 members of Drugbuyers.com.[4] Individuals join Drugbuyer's because they procure pharmaceuticals from online pharmacies; because members purchase medications to treat chronic conditions, membership on Drugbuyer's is thought to be stable.[4] Among Drugbuyers members, 90% self-treat (e.g., without physician oversight) chronic pain with opioid analgesics. Up to 925 unique individuals visit Drugbuyers at any one time, with an average of 22 minutes spent on the Web site per visit.[4] The average age of Drugbuyer's members is 38 (range: 18–67); 59% are

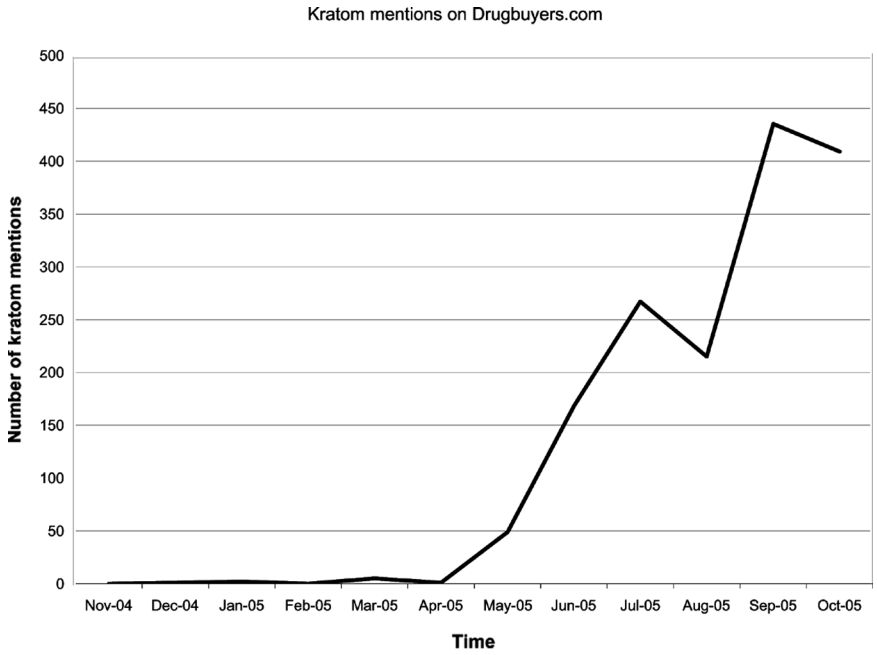

FIGURE 1. Kratom Mentions on http://www.drugbuyers.com over a One-year Period. The Upsurge in Kratom Mentions Coincided with a 2005 U.S. National Drug Intelligence Center Report Describing Potential Applications for Kratom, Including Treatment of Opioid Withdrawal.

female.[4] Members post an average of 0.5–1.0 messages per minute on the Web site's forums.

We used the Drugbuyers.com internal search function to identify each instance where Kratom was mentioned on Web site forums (''mentions'') over a one-year period. Mentions are contained within threads, or series of messages posted as replies to one another; we identified the initial post on every thread that mentioned Kratom. We abstracted the initial post, removed all identifiers such as Drugbuyer's boardname, and placed all posts in random order prior to review. Because postings on Drugbuyer's forums were made anonymously and with no expectation of privacy, our Institutional Review Board concluded that this study was excluded from review.

The dataset used in this study was empiric and was intended to provide preliminary information on the reasons for which Drugbuyer's members used Kratom. We analyzed the study variable using Kappa and descriptive statistics. We used an abstraction form to collect information about Kratom use. By means of simple, dichotomous answers (''agree/disagree''), examiners assessed the intent underlying Kratom use described in the initial post. Masked versions were coded independently by two examiners trained in the use of the form, working according to an instruction manual, and blinded to results until all data collection was complete. We determined, using the Kappa statistic, the degree of interobserver agreement between coders.

RESULTS

The period between November 1, 2004, and October 31, 2005, saw a dramatic increase in the number of Kratom mentions on Drugbuyers (see Figure 1). We identified 170 topic threads describing sources of Kratom (including 38 Internet vendors primarily from the United States, United Kingdom, Netherlands, and France), promotions from Web sites selling the herb, and online introductions to new forum participants. In addition, 72 total threads (42%) contained information on the pharmacology, dosing, and route of administration of Kratom. Twenty-seven threads described indications for Kratom; selected themes related to Kratom use are presented in Table 1. While a single thread described using Kratom as a stimulant and as an antidepressant, members overwhelmingly used Kratom for self-treatment of withdrawal from opioid analgesic agents.[4] Despite the subjective nature of the study, there was a substantial agreement between coders ($K = 0.65$, bias index -0.03, prevalence -0.88).

DISCUSSION

These data suggest striking increases in the use of Kratom to modulate opioid withdrawal by individuals who procure opioid analgesic agents from Internet pharmacies. A large proportion of Drugbuyer's members

TABLE 1. Selected thematic descriptions related to Kratom use

Themes	Postings related to Kratom (*Mitragyna* sp.)
Use of Kratom during opioid holidays	"I know now these drugs do no last because the body developes tolerance to their effects, and for this reason . . . patients and their doctors must continually adjust and endure so-called "drug holidays" just so that they will continue to work without dosages required spiralling sky-high. [T]here is Kratom to help. . . .'
	"Day 1 – Bali Kratom – flat freaking amazing. I felt almost at 100% with no hydro[codone] and I take TONS OF IT. (Seriously. I'm embarassed and ashamed [of] it.) It was . . . a miracle. (I've withdrawn from opiate[s] . . . many times over the years. . . .)'
	"Even for me – the doubting Thomas . . . looking for "the rub" . . . Kratom truly out-performed all of my expectations. It doesn't replace hydro by any means. That warm, comfort of hydro running up your spine won't be found in a gob of "the dirt," but it . . . takes away all the withdrawl symptoms and I can move about my day, in corporate America, without a soul knowing [I'm doing a holiday].'
Kratom as an opioid replacement therapy	"'I'm an addict! I've never had ONE of anything in my entire life! I'm sure my Kratom use will be as it was with anything else I've picked up. [I]f it keeps me from buying pills I'm happy to switch addictions.'
	"Dependence on Methadone, though my methadone is legit and needed, not for addiction but nerve damage. [Plus] 200 mg of hydro a day, and about 6 and a half grams of tylenol. Started on the Kratom—no withdrawal at all."
Opioid analgesic agents and Kratom in the context of previous illicit drug use	"I hadn't been much of an addictive person until the damn "blue demons" (hydro 10/500 which I could take up to 20+ a day) I know I did a number on my liver already, but don't drink much at all these days so hoping it will be ok. The funny thing is in high school I had tried coke, mescaline, acid, pot. . . . you name it, if someone gave it to me and said I'd get high, I'd take it and ask questions later (if at all!) I never became addicted to them. Now, sin[c]e using Kratom I feel better than ever. . . ."
Kratom as an economical alternative to opioid anagesics	"Just thought I'd post my "pros" with Kratom since trying it for the first time last Thursday. My background: est. 20/day of 10/325 hydros . . . started for legitimate pain, needed more and more . . . nothing new there. I had absolutely no W/Ds at all going practically cold turkey . . . I [am not] constipated . . . thus less laxative use; Cheaper than hydro; Don't need . . . [medical] records."

(*Continued*)

TABLE 1. Continued

Themes	Postings related to Kratom (*Mitragyna* sp.)
Kratom as providing hope to opioid-tolerant persons	"I have to quit this endless cycle of pill popping. It's . . . controlling my life. I've been on 15–20 Norco a day for about 8 months. Before that about 10 a day for 1 year . . .. When I read about Kratom I was pumped . . .. So will this Kratom releive all my Physical Symptoms?? Will I be able to go to work??"
	"Well, I've figured out by this time that you can't get rid of years of Hydro in a few days. I took Kratom again last night, and slept soundly, thank goodness! I plan on continuing the Kratom now . . . until I can wake up in the morning without the shakes. At first I thought this was like a 7 day [holiday], now I know it will be a little longer, but I can do it with the Kratom."

self-treat chronic pain without physician supervision; the appropriation of responsibility for chronic pain management suggests that Drugbuyer's members are committed to using, not quitting, opioids. At the same time, members distinguish themselves from addicts because drugs improve their ability to function rather than limit it.[4] Because they patronize Internet pharmacies but shun physicians, pain clinics, and drug treatment centers, Drugbuyer's members lie at the intersection of pain treatment and paths to abuse and addiction.[4] To ameliorate the social and economic costs of chronic opioid analgesic abuse, Drugbuyer's members take medication "holidays", or temporary periods of intentional abstinence, that are intended to decrease opioid tolerance as well as the cost of treatment once opioid therapy is resumed. At $10 to $40 per ounce of plant material (and a recommended dose of 1–8 grams), Kratom is an economical alternative to established opioid replacement therapies such as buprenorphine that are available from Internet pharmacies.[12,13] Interestingly, the upsurge in mentions coincided with a 2005 U.S. National Drug Intelligence Center report describing potential applications for Kratom, including treatment of opioid withdrawal.[11] The increased use of Kratom has led to its being listed as a drug of concern by the U.S. Drug Enforcement Administration.

This exploratory study provides preliminary information on reasons for which Kratom is used; it does not, however, explain why some Drugbuyer's members select a home remedy for opioid withdrawal in lieu of formal drug treatment programs. This preference may reflect the increasing interest in alternative therapies such as dietary supplements, herbal products, and others for chronic medical problems.[14,15] Alternatively, Drugbuyer's members may feel that their opioid use is not problematic, or that drug treatment is reserved for users of illicit substances.[4] In this vulnerable population, the utilization of and barriers to formal drug treatment, as well as the reasons for which pain treatment and addiction management clinicians have failed to engage members of this community, are unknown.

This study highlights the potential of the Web as a tool for identifying emerging drug practices in hidden populations. Proposals that the systematic assessment of first-person reports of drug use episodes from online drug encyclopedias (e.g., "trip reports" on http://www.erowid.org) could identify sentinel drug use events have not borne fruit.[16] For a number of reasons (e.g., a fraction of the trip reports submitted to online encyclopedias are selected for release, Webmasters stop releasing reports related to some common drugs, and submissions are edited by the Web site staff), online encyclopedias cannot provide systematic surveillance data on drug use behaviors.[17] Because submissions to Web sites such as Drugbuyers.com are automatically entered and undergo no screening, these messages offer a real-time glimpse at the drug-taking behaviors of the community populating that forum. Furthermore, the use of boardnames (a unique moniker by which individuals are known to the online community) on webforums confers additional advantages for drug use surveillance. For example, specific individuals who introduce new drug use information and behaviors to the online population can be identified. Because these persons may serve as opinion leaders for the virtual community, their effect on drug use knowledge, attitudes, and behaviors of the online population can be assessed. The dissemination of drug use information, as well as changes in drug use behavior, can therefore be tracked through social networks of Web-based drug users.

We recognize that our data are preliminary and our study population is selective. Nonetheless, these findings raise important questions regarding the impact of the Internet on drug abuse behaviors of distinct populations. Understanding the relationship between online pharmacies, chronic pain, and Internet-based information on treatment for opioid withdrawal may be important to the generation of effective opioid analgesic abuse

prevention strategies for maturing adults who suffer from chronic pain. Additional research in this area is urgently needed.

This research was supported by grant R21DA22677 from the National Institutes of Health, Bethesda, Md (Dr. Boyer).

REFERENCES

1. Compton W, Volkow N. Major increases in opioid analgesic abuse in the United States: concerns and strategies. *Drug Alcohol Depend*. 2006;81:103–117.
2. Siegal H, Carlson R, Kenne D, Swora M. Probable relationship between opioid abuse and heroin use. *Am Fam Physician*. 2003;67:942–945.
3. Forman R. Availability of opioids on the Internet. *JAMA*. 2003;290:889.
4. Boyer E. Internet pharmacies and online opioid purchases. *Community Epidemiology Work Group Annual Meeting*. Phoenix, Ariz.: National Institutes on Drug Abuse; January 18–20, 2006.
5. Shellard EJ. Ethnopharmacology of Kratom and the mitragyna alkaloids. *J Ethnopharmacol*. 1989;25:123–124.
6. Shellard E. The alkaloids of Mitragyna with special reference. *Bull Narc*. 1974;26:41–55.
7. Yamamoto LT, Horie S, Takayama H, et al. Opioid receptor agonistic characteristics of mitragynine pseudoindoxyl in comparison with mitragynine derived from Thai medicinal plant *Mitragyna speciosa*. *General Pharmacology* 1999;33:73–81.
8. Thongpradichote S, Matsumoto K, Tohda M, et al. Identification of opioid receptor subtypes in antinociceptive actions of supraspinally-administered mitragynine in mice. *Life Sci*. 1998;62:1371–1378.
9. Matsumoto K, Yamamoto LT, Watanabe K, et al. Inhibitory effect of mitragynine, an analgesic alkaloid from Thai herbal medicine, on neurogenic contraction of the vas deferens. *Life Sci*. 2005;78:187–194.
10. Grewal K. Observation on the pharmacology of mitragynine. *J Pharmacol Exp Ther*. 1932;46:251–271.
11. *Herbal drug update: Kratom*. National Drug Intelligence Center 2005;4:4.
12. Siebert D. Available at: http://www.sagewisdom.org/kratomguide.html. Accessed 6 August 2007.
13. Psychoactive herbs. Available at: http://psychoactiveherbs.com/catalog/index.phb?cPath=21_31. Accessed 6 August 2007.
14. Eisenberg DM, Kessler RC, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional medicine in the United States. Prevalence, costs, and patterns of use. *N Engl J Med*. 1993;328:246–252.
15. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990–1997: results of a follow-up national survey. *JAMA*. 1998;280:1569–1575.
16. Condon T. Drugs, youth and the Internet. In: *Conference on Drugs, Youth and the Internet*. Bethesda, MD.: National Institutes on Drug Abuse; 2002.
17. Erowid E. Procedure for inclusion of trip reports on Erowid.org. In: *Conference on Drugs, Youth and the Internet*. Bethesda, MD.: National Institutes on Drug Abuse; 2002.